Fig. 1(a)

input
terminal

○ — HPF 15 — delay 16 — ▷ 17a — ⊕ 18 — output terminal ○ 12

11

band-
decomposition
unit 13

→ harmonic-series-
generating unit 14a — ▷ 17b

→ harmonic-series-
generating unit 14b — ▷ 17c

⋮

→ harmonic-series-
generating unit 14c — ▷ 17d

Fig. 1(b)

input
terminal

○ — delay 16 — ▷ 17a — ⊕ 18 — HPF 15 — output terminal ○ 12

11

band-
decomposition
unit 13

→ harmonic-series-
generating unit 14a — ▷ 17b

→ harmonic-series-
generating unit 14b — ▷ 17c

⋮

→ harmonic-series-
generating unit 14c — ▷ 17d

Fig. 1(c)

input
terminal

○ — delay 16 — ▷ 17a — ⊕ 18 — output terminal ○ 12

11

band-
decomposition
unit 13

→ harmonic-series-
generating unit 14a — ▷ 17b

→ harmonic-series-
generating unit 14b — ▷ 17c

⋮

→ harmonic-series-
generating unit 14c — ▷ 17d

1/12

Fig. 2

Fig. 3

Fig. 4

*1	*2		frequency interval (Hz)										*13
27.5	A	0											27.5
29	A#	0											29
31	B	0											31
33	C	0											33
35	C#	0											35
37	D	0											37
39	D#	0											39
41	E	0											41
44	F	0											44
46	F#	0											46
49	G	0											49
52	G#	0											52
55	A	1						*8					55
58	A#	1						29					58
62	B	1						31					62
65	C	1						33					65
69	C#	1						35					69
73	D	1						37					73
78	D#	1						39					78
82	E	1						41	*9	*10	*11	*12	82
87	F	1						44	51	60	68	78	87
92	F#	1						46	54	63	72	82	92
98	G	1						49	58	67	77	87	98
104	G#	1						52	61	71	81	92	104
110	A	2			*5	*6		55	65	75	86	98	110
117	A#	2			30	39	*7	58	68	79	91	103	117
123	B	2		*4	32	41	51	62	72	84	97	110	123
131	C	2		25	34	44	54	65	77	89	102	116	131
139	C#	2		26	36	46	57	69	81	95	108	123	139
147	D	2	*3	28	38	49	61	73	86	100	115	130	147
156	D#	2	19	29	40	52	64	78	91	106	122	138	156
165	E	2	20	31	43	55	68	82	97	112	129	146	165
175	F	2	21	33	45	58	72	87	102	119	137	155	175
185	F#	2	23	35	48	62	77	92	109	126	145	164	185
196	G	2	24	37	51	66	81	98	115	134	153	174	196
208	G#	2	25	39	54	70	86	104	122	142	162	184	208

*1: fundamental frequency (Hz)

*2: musical scale

*3: major 2nd

*4: minor 3rd

*5: major 3rd

*6: perfect 4th

*7: augmented 4th

*8: perfect 5th

*9: minor 6th

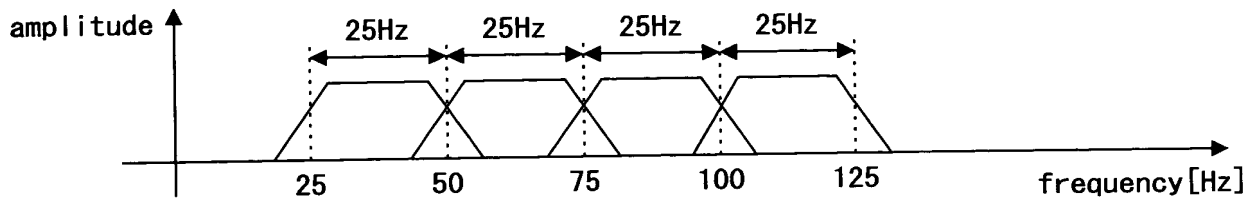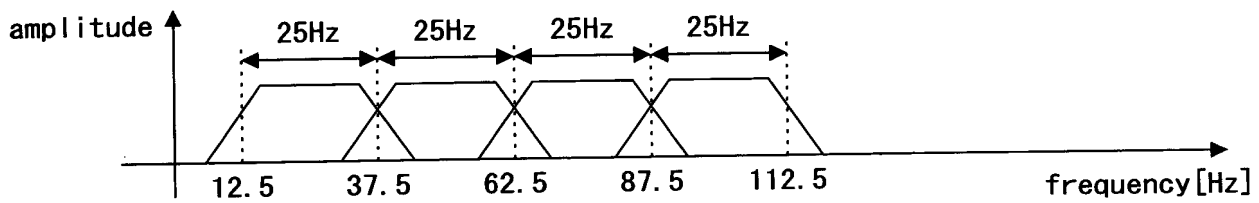*10: major 6th

*11: minor 7th

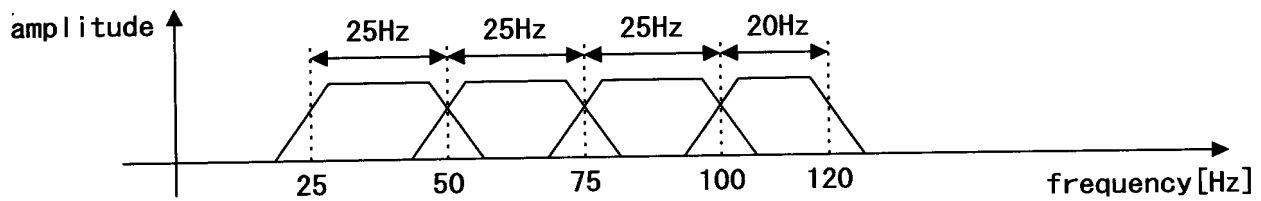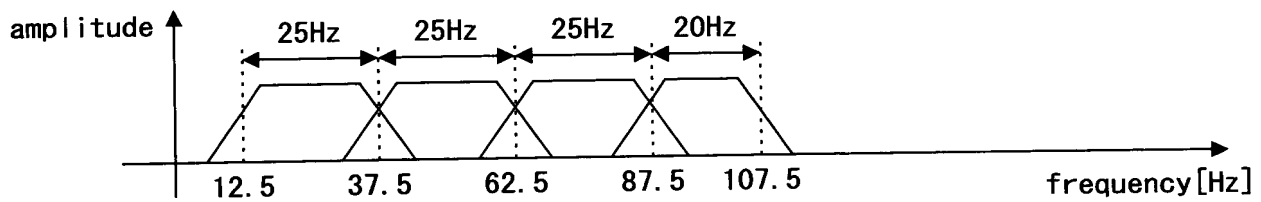*12: major 7th

*13: perfect 8th
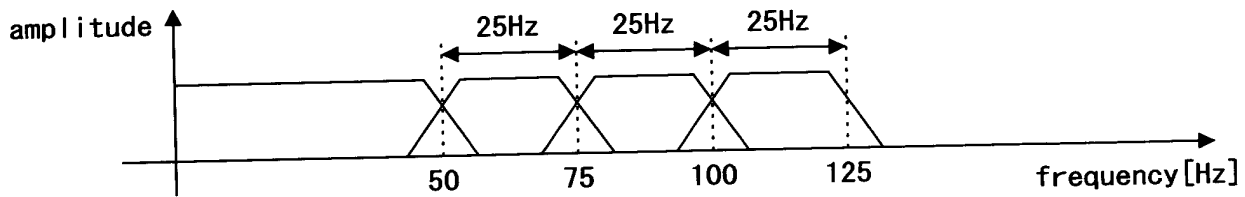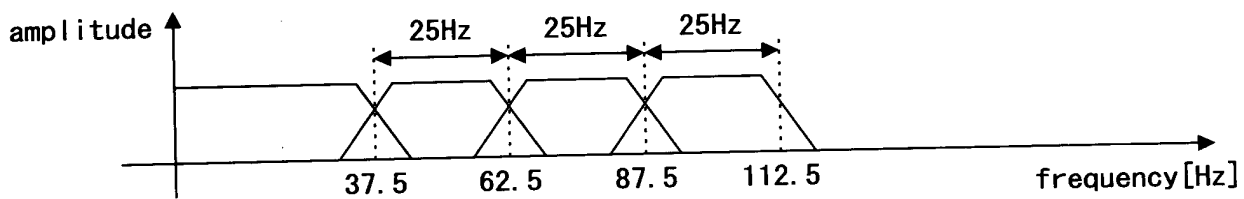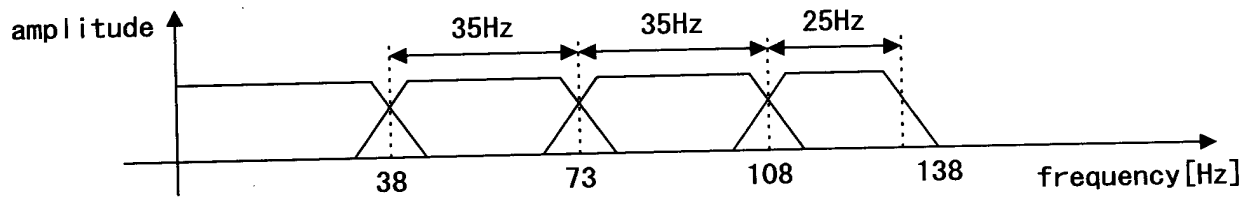
Fig. 5(a)

Fig. 5(b)

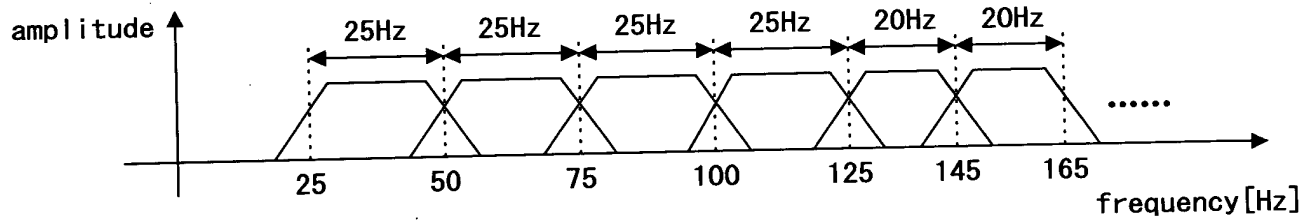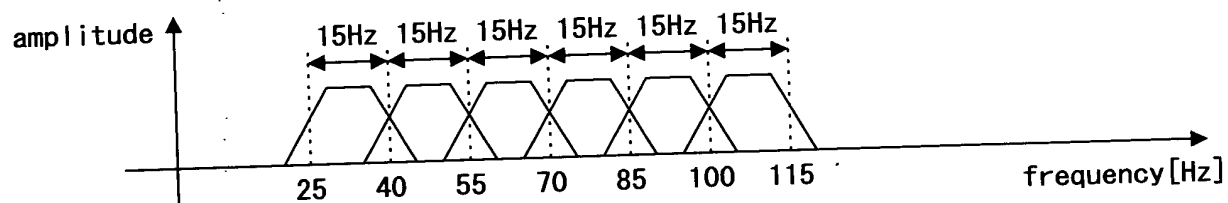Fig. 5(c)

Fig. 5(d)
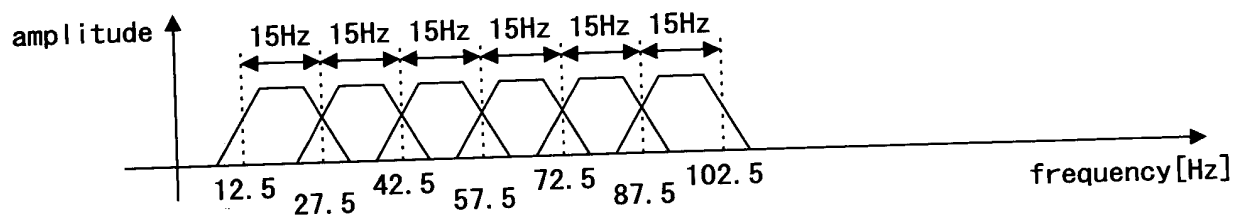
Fig. 6(a)

Fig. 6(b)

Fig. 6(c)
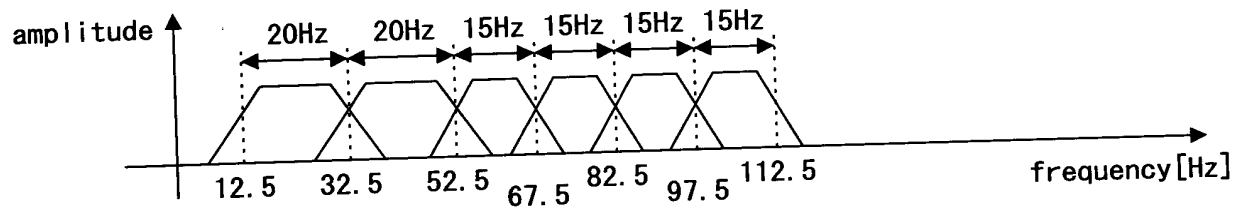

Fig. 6(d)

Fig. 7 (a)

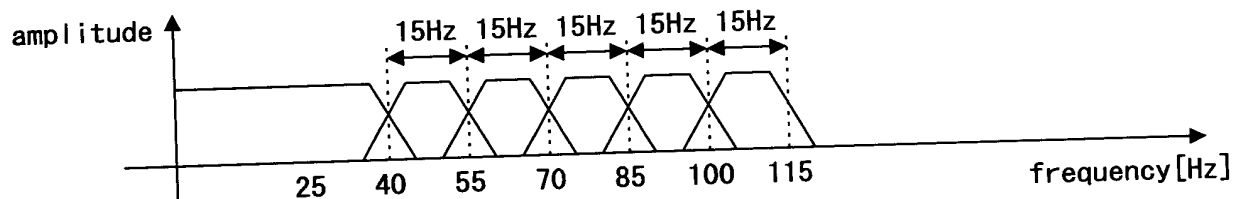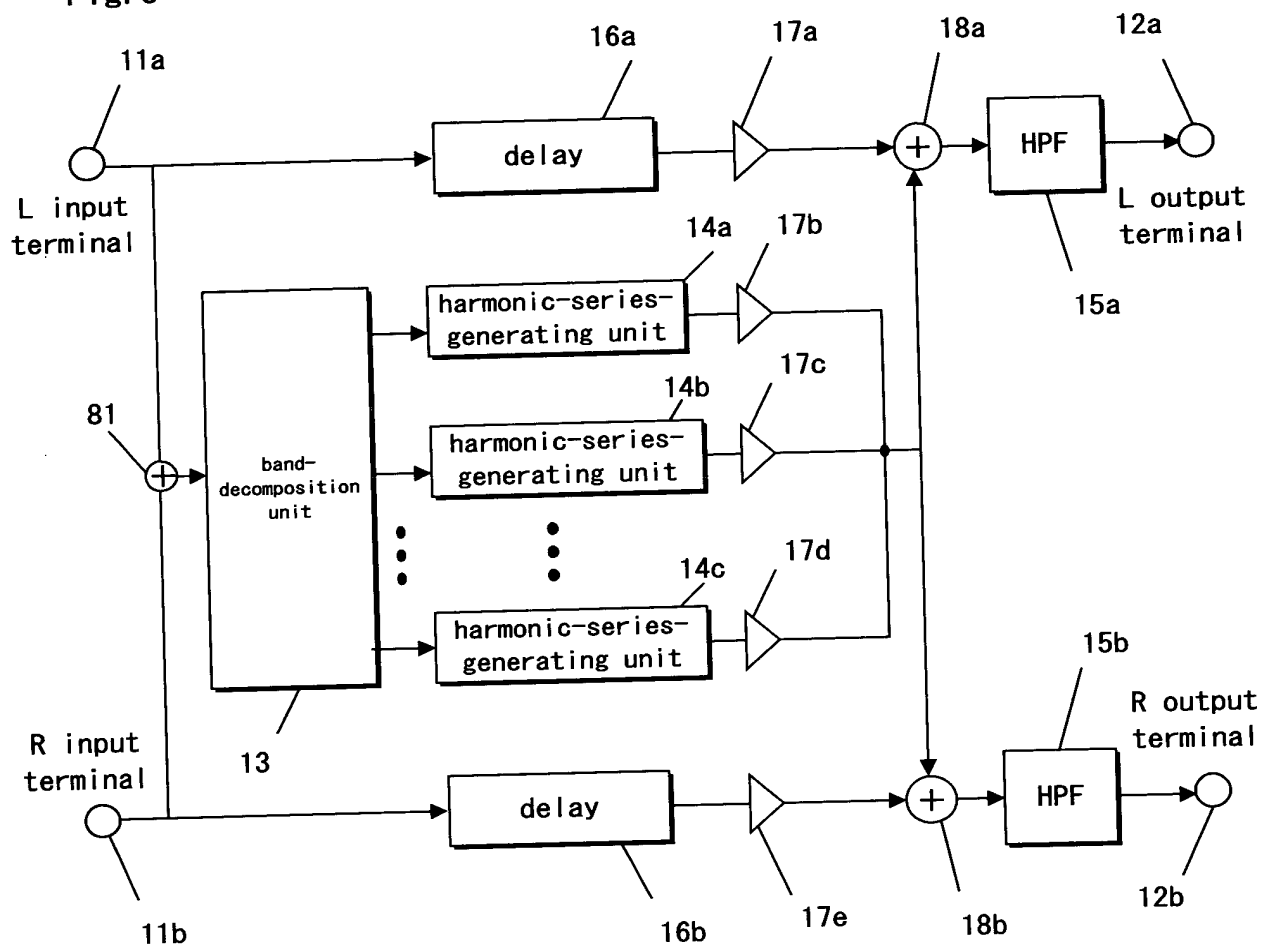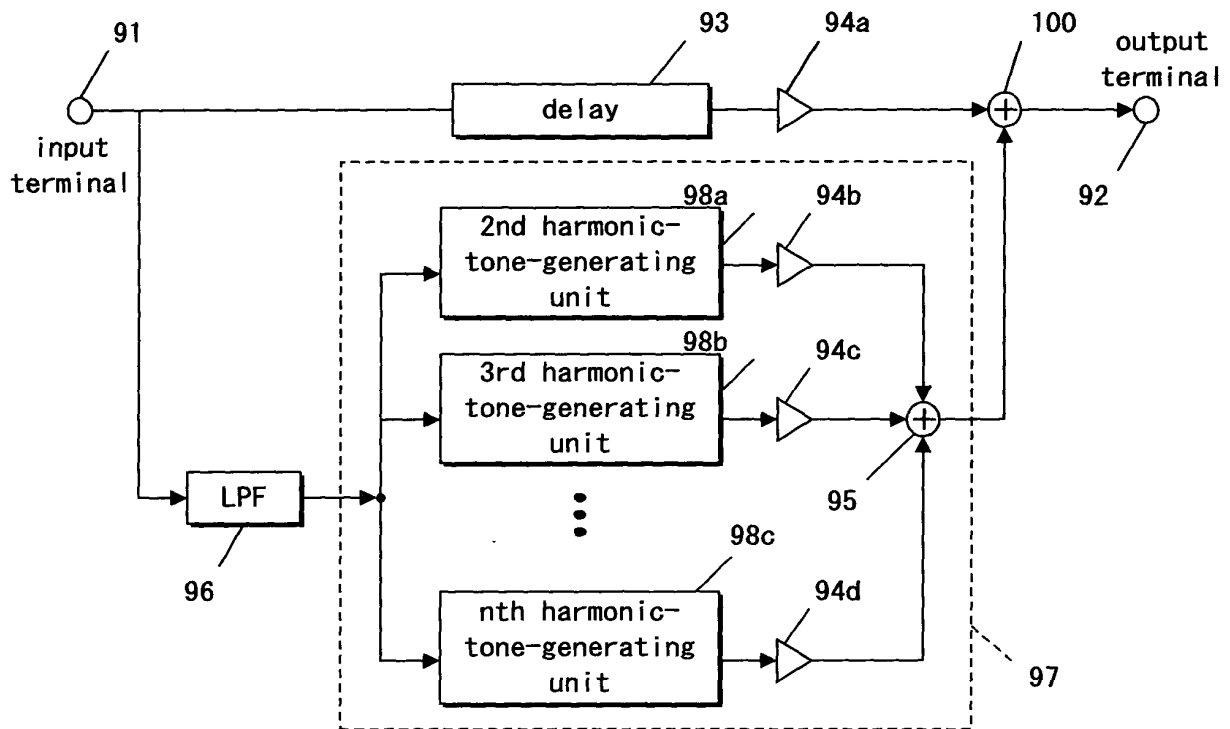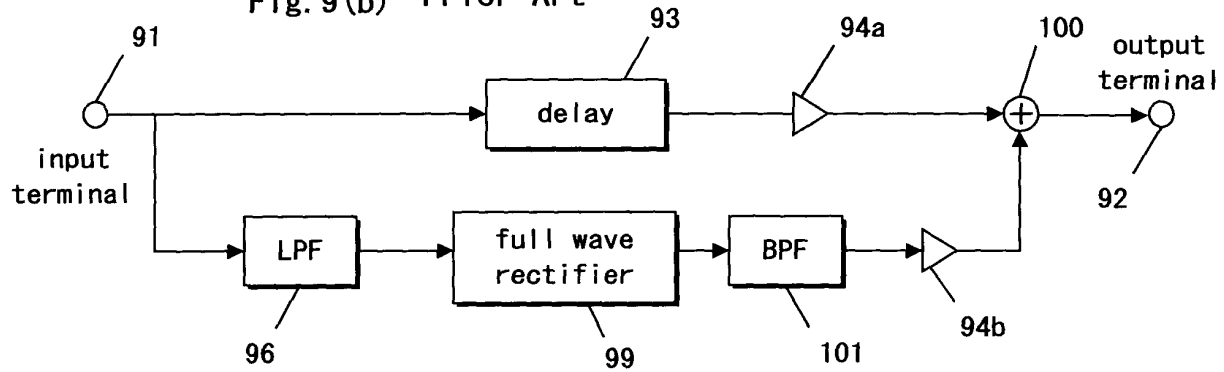Fig. 7 (b)

Fig. 7 (c)

Fig. 7 (d)

Fig. 8

Fig. 9(a)　Prior Art

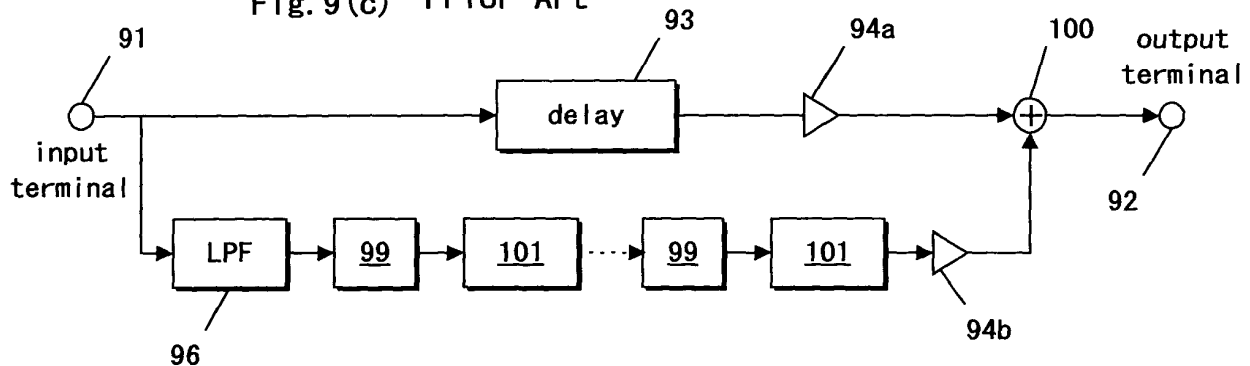## Fig. 9(b)　Prior Art
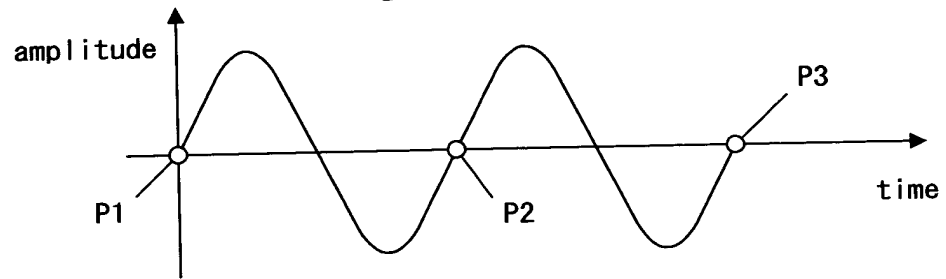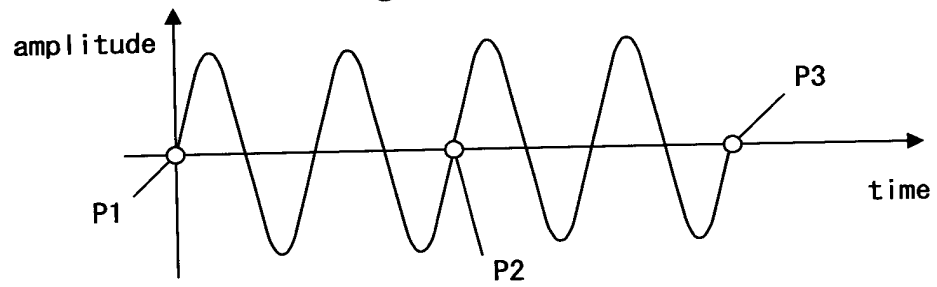

Fig. 9(c)　Prior Art

Fig. 10(a)   Prior Art

amplitude

P1

P2

P3

time

Fig. 10(b)   Prior Art

amplitude

P1

P2

P3

time

Fig. 11(a)   Prior Art

f (40Hz)

amplitude

harmonic-tone structure of musical
sound (f is fundamental frequency)

50   100   150   200   250   frequency[Hz]

Fig. 11(b)   Prior Art

f1 (40Hz)

f2 (80Hz)

amplitude

chord of perfect 8th
(f1:f2=1:2)

50   100   150   200   250   frequency[Hz]

Fig. 11(c)   Prior Art

f1 (60Hz)

f2 (90Hz)

amplitude

chord of perfect 5th
(f1:f2=2:3)

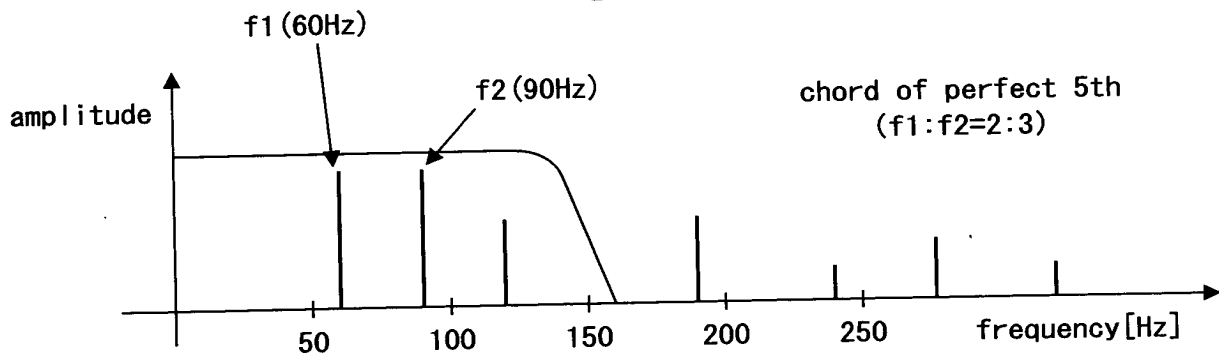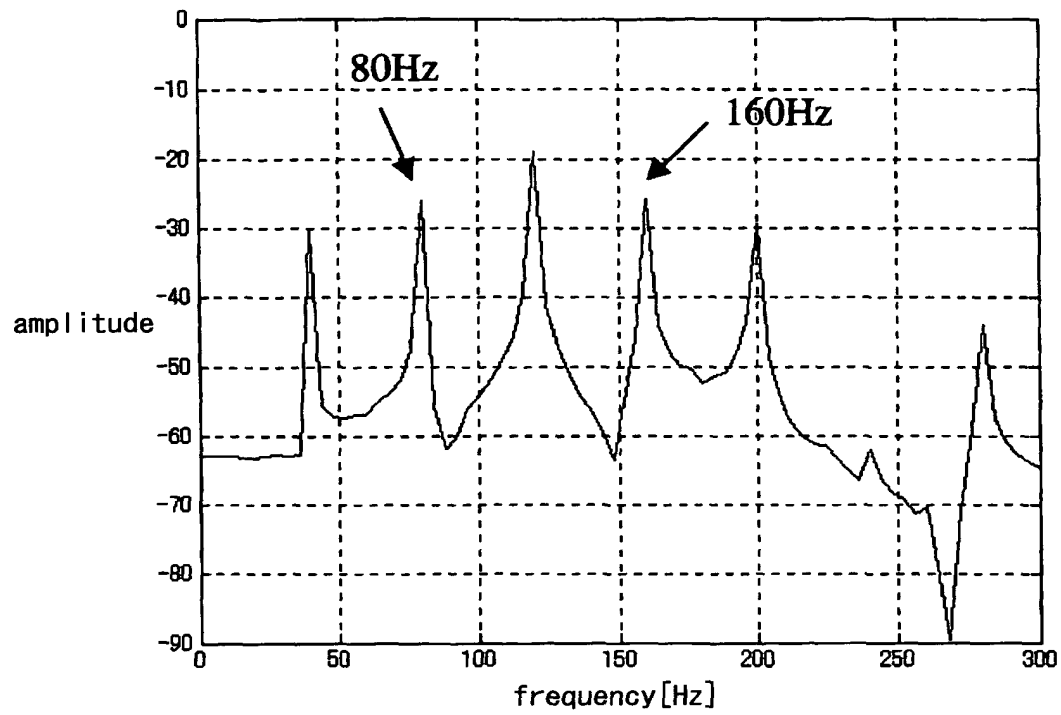50   100   150   200   250   frequency[Hz]
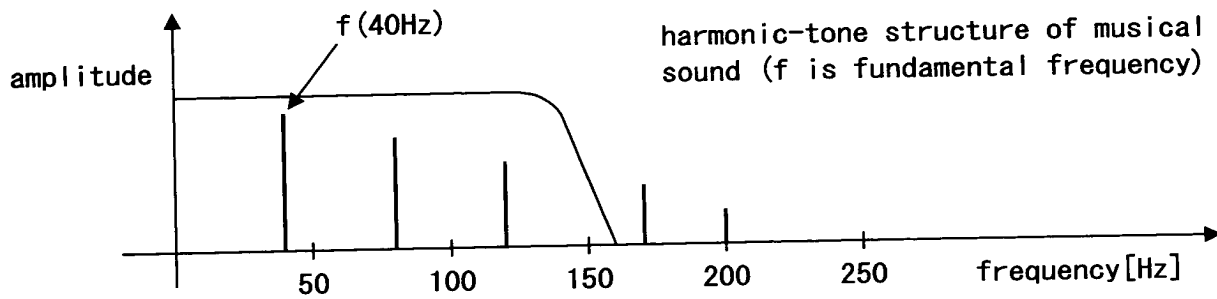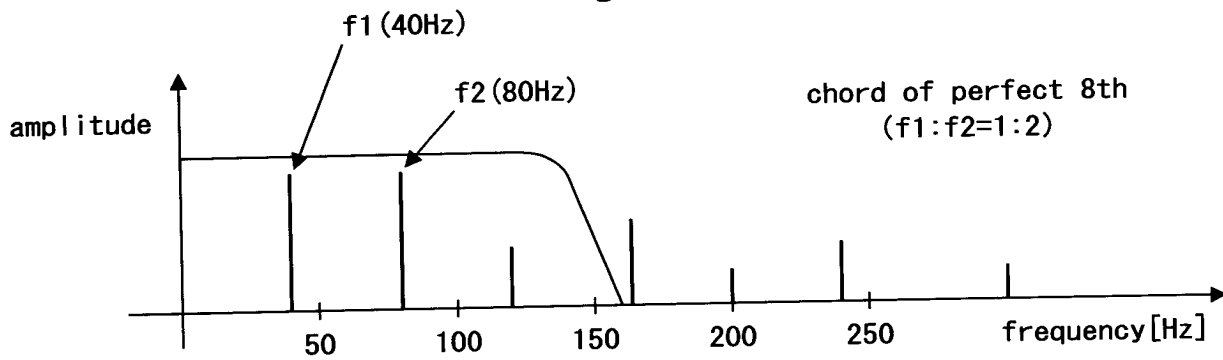
Fig. 12(a)   Prior Art

Fig. 12(b)   Prior Art
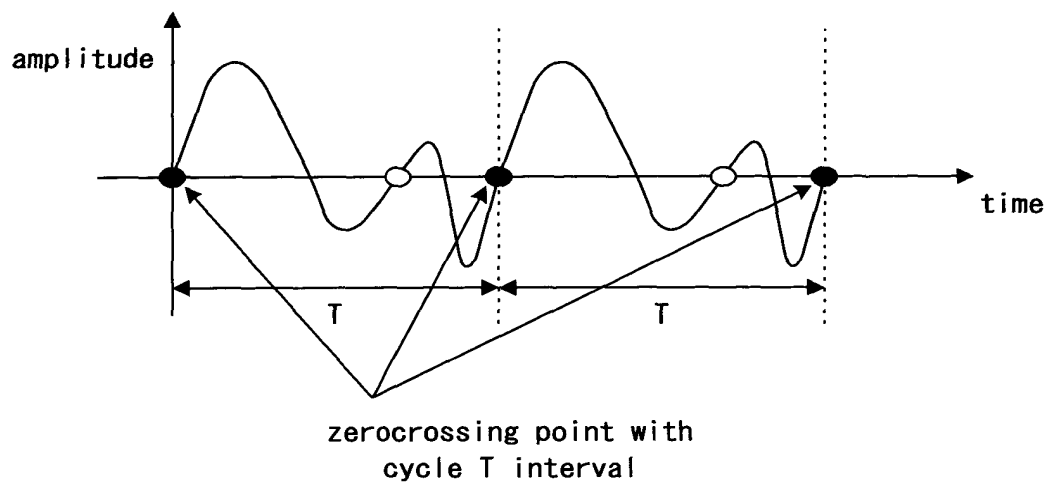

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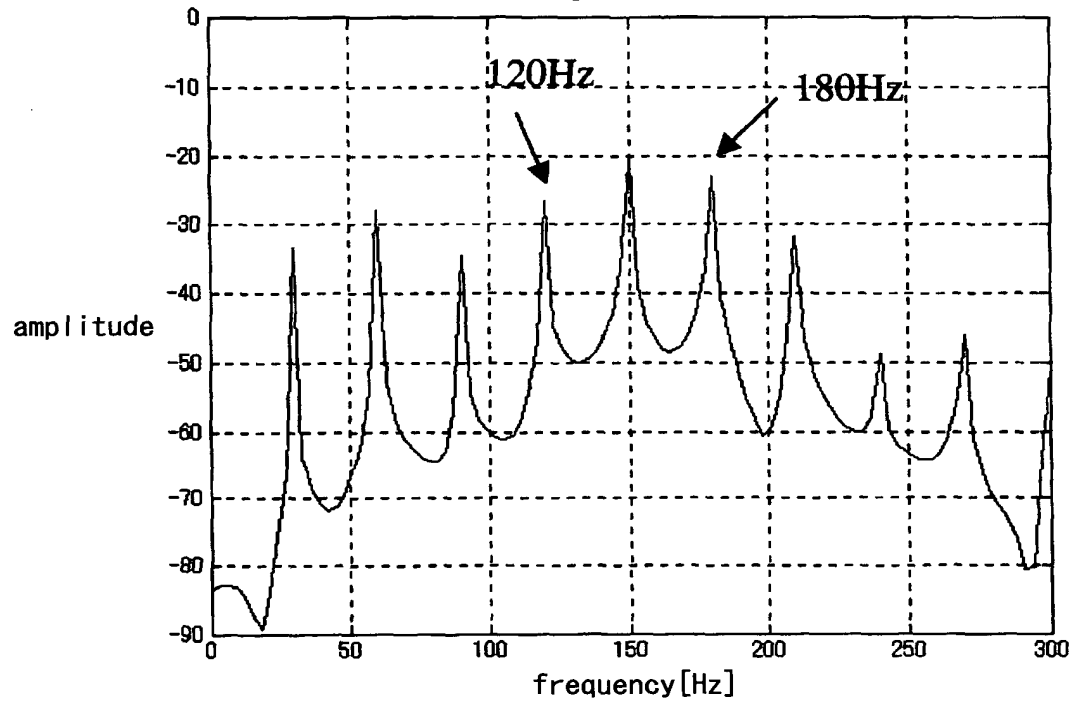
Fig. 13 (a)   Prior Art
(original waveform)

amplitude

time

T   T

zerocrossing point with
cycle T interval
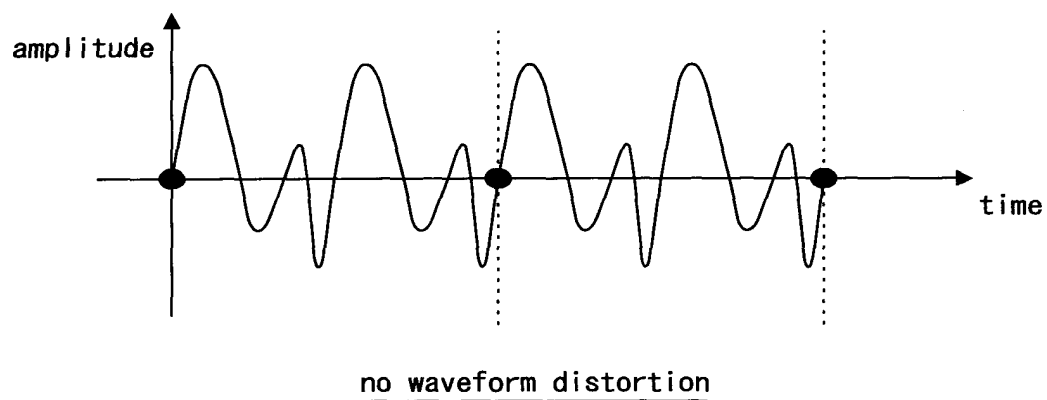
Fig. 13 (b)   Prior Art
(ideal)

amplitude

time

no waveform distortion

Fig. 13 (c)   Prior Art
(after processing)

amplitude

time

waveform distortion